

Erin Foresman
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

Subject: EPA ANPR, February 10, 2011; Public Response due by April 25, 2011

Water Quality Challenges in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. EPA's ANPR solicits public input on how water quality and aquatic resource protection goals can be achieved in the Bay Delta Estuary. This action requires an assessment of the effectiveness of current programs designed to protect water quality and aquatic species habitat in the San Francisco Bay/Sacramento-San Joaquin Delta in California (Bay Delta Estuary)

This ANPR discusses water quality contaminants including ammonia, selenium, and pesticides, as well as physical characteristics such as temperature, salinity and wetland habitat that are important to aquatic species. It also summarizes the regulatory framework for each of these stressors. EPA is soliciting comment on how to best use Clean Water Act programs to improve Bay Delta Estuary water quality. Strangely, "no new rules are proposed and the ANPR has no regulatory effect." This latter statement essentially assures that the ANPR will not be taken seriously; this was exactly the result of the recent SWRCB report on new flow standards for the system. EPA's ANPR and materials are at: www.epa.gov/region9/water/watershed/sfbaydelta

The basic problem is stated as present water quality in the Bay Delta Estuary reflects the cumulative and interactive effects of multiple physical, chemical and biological stressors, including sewage flows, storm water discharges, agricultural return flows, urban and agricultural pesticide application, water diversions, habitat degradation and non-native species introductions. The cumulative effect of these stressors has been to impair Bay Delta Estuary sustainability as a viable habitat for a rich mix of productive species. The system has essentially been converted into a single-purpose hub of California's water distribution system, bypassing the heart and soul of the natural delta.

It is my professional opinion that the only stressors of any consequence are salt and fresh waters that mix and interact in determining the natural variability and sustainability of the Bay Delta Estuary. The predicted future tidal rise will just exacerbate the situation and will squeeze the remaining life from the estuary. For many decades this natural fresh-salt water balance has been upset by excessive water withdrawals for export south of the Delta. This pattern has occurred in both wet and dry years, and most seriously during drought years. The San Francisco Bay-Delta system formed and evolved over 1000's of years. Like many other estuaries throughout the nation and world-over diversions of excessive amounts of fresh water for human use has too often resulted in eventual demise of the system itself. In the Sacramento-San Joaquin delta salinization is the greatest enemy of a healthy estuary. Except in localized situations, most if not all the other stressors of concern are of no major import if enough flow remains to adequately flush these concentrated elements from the system. But, over the past 100 years the retention time in the Bay-Delta has gone from mere months to years, and the system has therefore been overwhelmed by the accumulation and interaction of all these other stressors. Ammonia from the

Sacramento Sanitation District's discharge would not be a problem if adequate flushing of the system had not been retarded with excessive flow diversions in the past few decades.

In summary, health and productivity in estuaries are governed primarily by freshwater flows, flushing and salt balance provided by tidal motion. These properties are well known due to the seminal works of my late mentors Donald W. Pritchard in the Chesapeake Bay and elsewhere, and Joel W. Hedgpeth in Texas and on the West Coast. Following on this intellectual training and experience I have been further honored to work for over two decades with my colleague Michael A. Rozengurt, on the science, politics and eventual historic demise of the San Francisco Bay-Delta ecosystem. This result was clear to us from the beginning in the 1980's, but it is most noteworthy that none of the many publication resulting from this work are ever cited in more recent Bay-Delta System reports.

Even that late, great U.C. Berkeley hydrologist, Luna Leopold took the time to peer review Rozengurt's findings of flow statistics, and came to the conclusion (in his 6-pg letter) that "Rozengurt was right," and that his basic findings were soundly supported by his detailed statistical data analysis. Luna Leopold was a distinguished member of the National Academy and a member of revered scientific lineage. And, yet, nowhere has EPA or the SWRCB seen fit to use his findings in their quest to set standards that might reverse the obvious degradation still ongoing in the Delta. Leopold's findings were transmitted to the SWRCB by the USF Tiburon Center for Environmental Studies on Oct 6, 1987 following a July 13, 1987 presentation by Rozengurt, Hertz, and Feld of their 1987 Tiburon Report's findings (see below) at the SWRCB D1415 hearings on the Delta. Leopold's own analyses basically agreed with the major finding of the Tiburon study: "First, that the role of fresh water is of highest importance in controlling salinity and the functioning of the "nutrient trap...." Second the Tiburon Report shows that the use of an unsatisfactory data set to describe the available water has in the planning and construction stages seriously underestimated the probability of critical dry conditions in the estuary.... Third, the report shows what should be an obvious fact, that continued diversion of the same magnitude of water in dry years as well as in wet years makes a much larger percentage change in available water in a dry period as in a wet.... Forth, the amount of water diverted has continued to increase with time despite the data on biological conditions and salinity that have given ample notice that even the present amount of diversion is impacting the ecosystem." Here is a transcendent hydrologist/internationally acclaimed river expert, Leopold, reflecting over 25 years ago on the similarities between myopic water exploitation planning on the Volga, Don and Sacramento and other great rivers and the impact on their estuaries. Clearly, our overoptimistic hydrology and ignorance of estuarine function has brought us to the brink today, in which almost any additional stressor can bring disaster.

First, we must restore the water and salt balance that is the essence of an estuary. Rozengurt was right about this too, and has proposed a physical structure – a restraining channel – that can be used to restore a smaller but more functional estuarine realm

Sincerely, Irwin Haydock Ph.D.

cc: Michael Rozengurt, PhD.,

cc: Delta Stewardship Council, Attn: Phil Isenberg

REFERENCES: Rozengurt, et. al., 1971 – 2003.

Rozengurt, M.A. (1971). *Analysis of the Impact of the Regulated River Runoff on Salt Regime of the Dniester Estuary*. Publ. Naukova Dumka (Scientific Thought). Kiev, Ukraine. U.S. Library of Congress, GC12LR 6.

Rozengurt, M.A. (1974). *Hydrology and Prospectives of Reconstruction of Natural Resources of the north-western Black Sea Esturaries*. Publ. " Naukova Dumka" . Kiev, Ukraine. U.S. Library of Congress , GB2308.B55R69.

Rozengurt, M.A. 1981. Development of a physical model of salinity restraining channel to control salinity into estuaries. Case Study: San Francisco Bay. Author's Report

Rozengurt, M.A. and M.J. Herz. 1981. Water, water everywhere but just so much to drink. (pp. 65-67) Oceans. Sept.

Rozengurt, M.A. and I. Haydock. 1981. Methods of computation and ecological regulation of the salinity regime in estuaries and shallow seas in connection with water regulation for human requirements. In: R.D. Cross and D.L. Williams (eds.), *Proceedings of the National Symposium on Freshwater Inflow to Estuaries II*:475-507. U.S. Department of the Interior, Washington, D.C.

Rozengurt, M.A., M.J. Herz, and M. Josselyn. 1985. In: D.L. Goodrich (ed.) *San Francisco Bay: issues, resources, status, and management*. NOAA Estuary-of-the-Month Seminar Series No. 6. (pp. 35-62) NOAA, Washington, D.C.

Rozengurt, M.A., M.J. Herz, and S. Feld. 1987a. Analysis of the Influence of Water Withdrawals on Runoff to the Delta - San Francisco Bay Ecosystem (1921 - 1987). Technical Report No. 87-7 (Library of Congress, # 2 091 239) Tiburon Center for Environmental Studies, San Francisco State University, Tiburon, CA.

Rozengurt, M.A., M.J. Herz, and S. Feld. 1987b. The role of Water Diversions in the Decline of Fisheries of the Delta - San Francisco Bay and other Estuaries(1921-83). Technical Report No. 87-7. Center for Environmental Studies, San Francisco State University, Tiburon, CA.

Rozengurt, M.A., M.J. Herz and S.A. Feld. 1988. Closing Brief Findings of fact & recommendations for the Bay-Delta hearings. SWRCB Phase 1 of the Bay-Delta Estuary Hearings held at UC Davis. Feb 1, 1988. Submitted by Romberg Tiburon Center for Environmental Studies, SFSU, San Francisco, CA.

Rozengurt, M.A., and J.W. Hedgpeth. 1989. The Impact of Altered River Flow on the Ecosystem of the Caspian Sea. *Reviews in Aquatic Sciences* Vol. 1, 2, pp. 337-362.

Rozengurt, M.A. 1991. Strategy and ecological and societal results of extensive resources development in the South of the U.S.S.R. In: *Proceedings, The Soviet Union in the Year 2010*. USAIA and Georgetown University, Washington, D.C.

Rozengurt, M.A. and I. Haydock. 1991. Effects of fresh water development and water pollution policies on the world's river-delta-estuary-coastal zone ecosystems. In: H.S. Bolton (ed.), *Coastal Wetlands Volume, Coastlines of the World*. (pp. 85-89) Coastal Zone '91, *Proceedings of the Seventh Symposium on Coastal and Ocean Management*. American Society of Civil Engineers, New York, NY.

Rozengurt, M.A. 1992. Alteration of freshwater inflows. In: R.H. Stroud (Ed.), "Stemming the Tide of Coastal Fish Habitat Loss." 14:73-80. National Coalition for Marine Conservation, Savannah, GA.

Rozengurt, M.A. and I. Haydock. 1993. The role of inland water development on the systemic alteration of the coastal zone environment. In: *Proceedings of Watershed '93, A National Conference on Watershed Management*. U.S. EPA, Washington, D.C.

Rozengurt, M. A. and I. Haydock. (1993). *Freshwater Flow Diversion and Its Implications for Coastal Zone Ecosystems*. In *Transactions of the 58th North American Wildlife and Natural Resources Conferences*. Washington, D.C.

Rozengurt, M.A. 1994. Review of Water Quality Standards for the Sacramento River, San Joaquin River, San Francisco Bay and Delta of the State of California. Letter to Patrick Wright, EPA Reg IX, San Francisco, CA., Mar. 17, 1994. 14pp, 2figs, 10 Appendices, regarding Proposed Rule FR 59(4): 810-852; 40 CFR Part 131 [OW-FRL-4783-6] Jan. 6, 1994.

Rozengurt, M.A. 1994. Running on Empty: the distortion of coastal ecosystems. In *Proceedings of 7th International Biennial Conference and Coastal Seas: Buoyancy Effects on Coastal Dynamics*. Woods Hole Oceanographic Institution. Woods Hole, MA USA.

Rozengurt, M.A. 1997. Water and Salt Exchange Restraining Channel that can avert salt intrusion in Sacramento-San Joaquin Delta under current and planned freshwater diversions. Abstract, Invitational Presentation. International Water Symposium-97, Stockholm, Sweden and Amer. Inst. Hydrology. Agonizing Watershed-Coastal Seas Ecosystems: Critical Review of Alternatives.

Rozengurt, M.A. and J.W. Hedgpeth. 1997. Distortion of thermodynamic equilibrium of watershed - coastal seas' ecosystems. In *Proceedings "With Rivers to the Sea, Interaction of Land Activities, Fresh Water and Enclosed Coastal Seas"*. 7th Stockholm Water Symposium and 3rd International Conference on Environmental Management of Enclosed Seas (EMECS). 10 - 15 August. Stockholm, Sweden.

Rozengurt, M.A. 1998. Nobody can get something from nothing, a review: "The threat to CA Rivers and Coastal Ecosystems due to Excessive Impoundment of Rivers". CalFed Mar. 1998 EIS/EIR Public Hearing. Irvine High School, Irvine. CA. May 5. pp.2

Rozengurt, M.A. 1999. Running on entropy: the effect of water diversions on the estuary - coastal ecosystems. In: Hubert J. Morel - Seytoux "Hydrology Days" Colorado State Univ. Fort Collins, Colorado. pp.369 - 389.

Rozengurt, M.A. 2002. The Agonizing San Francisco Bay Ecosystem. *Hydrology Days. Proc. 22nd Ann. AGU Mtg. Apr 1-4, 2002. Colorado State Univ, Ft Collins CO. Jorge A. Ramirez, ed.*

Rozengurt, M.A. 2003. Agonizing Coastal Sea Ecosystems: Understanding the Cause; Placing the Blame. *Proc. 6th. Int. Conf. Mediterranean Coastal Environment- MEDCOAST 03, pp. 941-950. E. Ozhan, ed., 7-11 Oct 2003. Ravenna, Italy.*

Voronin, P. P., Rozengurt M.A., Tolmazin, D. M., Vinogradov, K. A., Lagutin, B.B. and K.M.Erlikh. (1974). *Hydrotechnical Structure. Patent, Certificate 417572. (1973). Bulletin #8, State Committee of the Council of Ministers of the U.S.S.R in Affairs of Inventions and Discoveries. Yevjevich, V.(1982). Stochastic Processes in Hydrology. Water Resources Publications. Littleton. CO.*